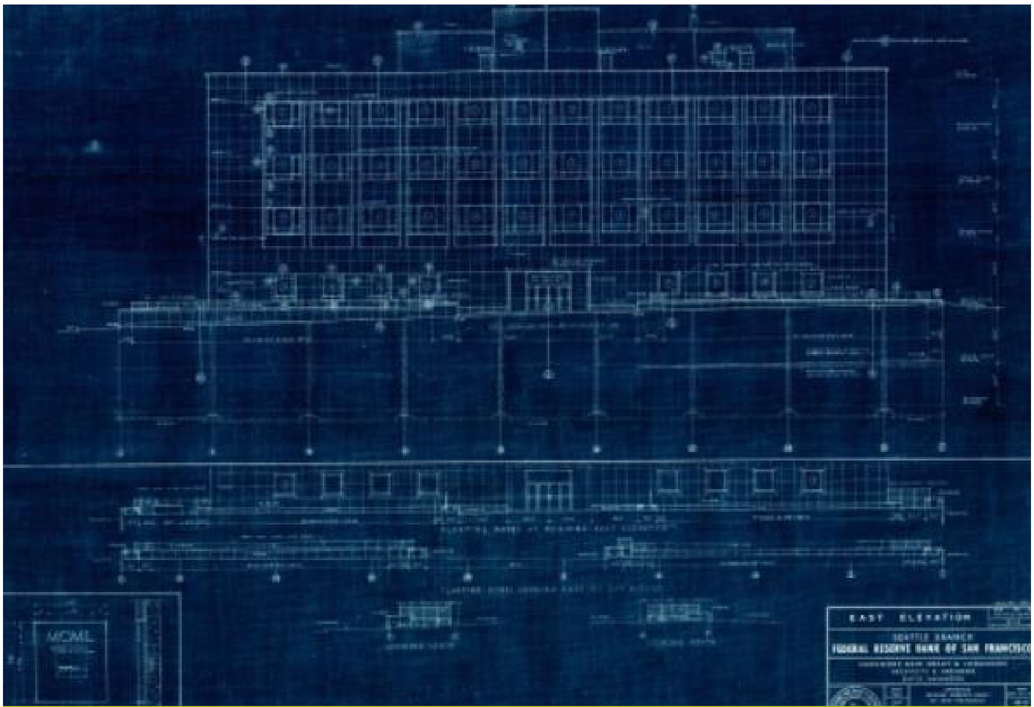
Making Buildings Better

rdhbe.com

Building Enclosure Condition Assessment Report | Project B8414.000

Seattle Federal Reserve Bank, 1015 2nd Ave., Seattle, WA



Historic Seattle PDA
SMR Architects
911 Western Avenue, Ste 200
Seattle, WA 98104

Submitted March 13, 2014 by
RDH Building Sciences Inc.
2101 N 34th Street #150
Seattle, WA 98103

Contents

1 Introduction

1.1 Terms of Reference

RDH Building Sciences Inc. (RDH) was retained by SMR Architects (SMR) to undertake an assessment of the current condition of the building enclosure of the Seattle Federal Reserve Bank building located at 1015 2nd Avenue, in Seattle, Washington.

This report documents the current condition of elements of the building enclosure. It also provides information related to the specific sources of moisture or other physical factors that have resulted in the observed conditions. Finally, it makes preliminary recommendations for repairs and outlines a strategy for negotiating adaptive reuse of this building within the requirements of the 2012 Seattle Energy Code (SEC).

This report has been undertaken for SMR Architects and Historic Seattle PDA and is not to be relied on by others.

1.2 Report Organization

The report is organized in accordance with five primary elements of the building enclosure as well as interior operating conditions:

1) Exterior Walls
2) Plaza Deck Membrane
3) Low-Slope Roof
4) Below-Grade Exterior Assemblies
5) Windows and Doors

Section 2 discusses our observations and the implications with respect to current and future building enclosure performance. Recommendations for rehabilitation and renewal of building enclosure assemblies are provided where appropriate. Further, observations regarding specific maintenance items may be made if they relate to a proposed rehabilitation or renewals recommendation; however, this report does not constitute an overall maintenance and renewals plan.

Our recommendations for rehabilitation and renewal are summarized in Section 3. Construction cost estimates and proposed timing associated with the recommendations made are presented with a discussion of alternate conceptual approaches, phasing, and the advantages of various implementation scenarios where appropriate.

1.3 Documents Reviewed

Table 1.1 lists the documents provided to and reviewed by RDH.

TABLE 1.1 DOCUMENTS REVIEWED

DOCUMENT DESCRIPTION	RECEIVED FROM
Architectural Drawings, dated 1948	NBBJ Architects
Structural Drawings, dated 1948	NBBJ Architects

1.4 Building Description

The Seattle Federal Reserve Bank is a 4-story half-block commercial building with 2 levels below grade. The building footprint area is approximately 25,000 square feet, and total gross square footage is approximately 105,500 square feet. The building is noncombustible construction with fireproofed steel floor structures and an interior, 2-story vault below grade.

The building is clad primarily in limestone veneer, with punched window openings. Cast-in-place concrete exterior walls exist at the west elevation. A podium slab and planters cover below-grade portions of the building. The main roof consists of a hot-applied rubber membrane ballasted with rigid insulation and insulated concrete pavers, with metal parapet flashings installed over the original stone copings.

Table 1.2 provides a description of the building.

TABLE 1.2 DESCRIPTION OF BUILDING	
Name	Seattle Branch, Federal Reserve Bank
Address	1015 2nd Avenue Seattle, WA 98102
Date of construction	1948
Number of floors	4, plus 2 levels below-grade
Floor area	Approximately 105,500 square feet
Applicable building codes	Uniform Building Code 1946
Building code classification	B Occupancy , Type I-B construction
Number of storeys	6
Type of construction	Concrete, steel floor and roof diaphragms with fireproofing
Sprinklered	Yes
Principal occupancy	Bank and offices
Other occupancies	Parking, assembly line, food service
Structural system	Load-bearing concrete exterior

1.5 Project Background

RDH's investigation included a visual review of accessible portions of the Bank's basement garage and below-grade areas, building exterior walls, horizontal waterproofing at occupied areas, and roof. Our methods included visual review of record drawings, observation of existing openings in perimeter walls, and photographic documentation. Interior openings in ceilings confirmed the condition of structural materials and building assemblies. Our observations on site were generally consistent with the original Architectural and Structural drawings found on-site.

1.6 History

The Federal Reserve Bank of Seattle was designed in 1948 by the Seattle firm of Naramore, Bain, Brady & Johanson. It was listed on the National Historic Register in 2013. The structural design was governed by the 1948 Seattle Building Code, which was revised later to include substantially stiffer seismic requirements following the 1949 Nisqually earthquake. However, as a bank and a federal property, the original design and construction is generally more robust than other commercial buildings of its time. In addition, the building has been consistently well maintained and underwent seismic improvements as well as several interior remodels in its history. The building has been unoccupied for approximately the last 6 years.

Table 1.3 lists a brief history of activities and events relating to the building enclosure assemblies as reported to us or as described in the documents we reviewed.

TABLE 1.3 BUILDING ACTIVITIES RELATED TO ENCLOSURE PERFORMANCE	
DATE	
1985	Seismic upgrades
1985-86	Windows replaced, except for Floor 1, east elevation
1998	South and West Elevation windows replaced, Floors 2, 3, and 4

2 Building Enclosure Elements

2.1 EXTERIOR WALLS

The street-level podium along the north and south elevations consists of concrete with granite cladding. Similar granite cladding exists at the main entry canopy and the window surrounds flanking the entry. The north, east, and south elevations of the building above the podium are clad with limestone veneer panels. Portions of the west (alley) elevation above the podium level are clad with terra-cotta brick. Roof penthouses are constructed of hollow clay tile and concrete walls, faced with terra-cotta brick.

From a review of the drawings, the stone veneer cladding is supported on dovetail wedges at each panel and with steel angles approximately 1 foot above the first-floor window heads. At the south elevation limestone cladding, localized splitting above the window heads is visible, evidence of corrosion in the steel ledger angles. Since the building is recessed from the street, investigation and repair of these conditions is not an imminent life-safety concern, but at a minimum, further water intrusion should be forestalled. According to Pioneer Masonry, limited repairs to these conditions were performed on the upper south elevation in 1999 and again to the lower granite cladding in 2013.

Portions of the limestone cladding on the east and north exterior are darkened and heavily streaked with dirt. As a calcareous material, limestone reacts with acids from pollution and rain, and its surface converts to gypsum. This thin scale of gypsum collects dirt and airborne particles when wetted, protecting the underlying surface but also contributing to the uneven weathering of the limestone panels when unevenly wetted. At more-exposed panels on the south and west elevations, the lack of this protective surface has resulted in minor to moderate freeze-thaw spalling of the limestone facing.

Mortar joints in the limestone cladding appear to be original, except for portions of the south and west elevations where RDH noted localized areas at which mortar had been replaced with sealant.

At the main entry, displacement of stone panels and moss growth and weeping at mortar joints indicate a failure of the waterproofing over the entry and subsequent water intrusion into the stone anchoring system. Since this condition occurs directly over the main entrance, we recommend immediate measures to repair this condition.

Stucco panels exist immediately on either side of the main entry, each with a scupper draining the recessed area beneath the East elevation window stacks. The scuppers were wet a day after a hard rain; however RDH was not able to inspect the condition of the small drained areas.

The West (Alley) elevation below the Entry level is cast concrete; above this level the elevation is clad in terra cotta brick. The cast concrete walls on the West (alley) elevations are painted with an elastomeric coating. Construction joints in the concrete are visible in the west stairwell at each floor, along with significant bubbling of the interior paint finish.

Window head flashings exist at several of the terra cotta brick window lintels, but caulk joints at these locations were installed without weep holes. Rust stains also exist, indicating that the window head flashings likely were installed without end dams, and that the lintels likely were not treated with an anti-corrosive coating. Both of these operations would have required the removal of brick, and RDH did not find evidence that the brick had been removed and/or replaced.

2.2 PLAZA DECK MEMBRANE

For the purposes of this report, the term **Deck** refers to a horizontal surface exposed to outdoors, located over a living space, and intended for pedestrian use in addition to performing the function of a roof. Where leakage occurs in a deck (as opposed to a balcony or other structure) it is likely that water will penetrate to the interior of the building or affect the structure. Significant portions of the basement level are either below the 2nd avenue sidewalk or below the building's entry plaza and plantings. RDH did not observe any active leaks from these areas.

The plaza deck assembly consists of precast concrete pavers on pedestals over a hot rubberized waterproof membrane on a concrete deck. Two-stage drains lead water away from the paver surface as well as the membrane below.

Upward-facing mortar joints at the stone planter copings are moderately weathered. At the intersection of the planters with the East elevation exterior wall, the base flashing is not adhered to the top of the flashing. Since the top of the planter coping is un-sloped, this is a potential water entry point.

2.3 LOW-SLOPE ROOF

The roof consists of ballasted 2" thick loose-laid insulated concrete pavers over 2 ½" rigid insulation sheets, over a hot rubberized asphalt membrane, concrete topping, and structural steel deck. The perimeter of the roof is sloped toward the center as a result of seismic improvements to the parapet. This sloping portion is covered with a conventional SBS 2-ply roofing membrane, and the original stone parapets are covered with a metal parapet cap. The standing seams, fasteners, and factory-applied finish of the parapet cap system are in serviceable condition, although the parapet cap is configured in such a way as to make replacement of the roof membrane difficult without removing the cap as well.

Several internal drains exist on the roof. At each, an EPDM sheet is flashed from the hot rubberized membrane into the drain body. According to the original drawings, the roof deck structure is un-sloped. No ponding is in evidence on the roof, and the drains appear to be functioning normally.

Roof penetrations are flashed, either with hot rubber membrane or EPDM boots, and counter-flashed with prefinished metal and sealant joints. Locally, some of the exposed sealant joints are cracked and brittle; however, RDH found no evidence of active leaks from the flashings in a review of the underside of the 4th floor structural deck.

2.4 BELOW-GRADE EXTERIOR ASSEMBLIES

Original drawings do not identify a means of waterproofing at the below-grade concrete walls, and RDH was not able to determine what type of below-grade waterproofing, if any, exists. However, neither did we find any evidence of leaks into spaces below grade.

2.5 WINDOWS AND DOORS

The original historic entry doors exist on the West elevation of the building, along with original windows on either side of the entry. Glass block in openings on the Basement level appears to be original to the building. All other windows on the building have been replaced at least once. From dates stamped on the IGU's, windows were replaced at the locations and dates indicated in Table 2.2.

In addition, the replacement glazing at the West elevation windows on floors 2, 3 and 4 have been wet-sealed after installation with silicone sealant at the glazing perimeters and around the window frames.

With the 1985 windows, evidence of water intrusion to the interior exists at several locations. Drips marks, efflorescence, and occasional puddles less than 2 square inches exist, particularly at floors 3 and 4 on the west elevation.

Glass block windows exist in concrete openings at the levels below the podium. Mortar joints in the glass block panels are installed with weep holes.

Replacement windows in the concrete openings in the West stairwell show evidence of water intrusion into the stairwell.

3 Discussion of Building Enclosure Performance

It is our understanding that adaptive re-use of this building will be considered a Substantial Alteration under the 2012 Seattle Energy Code (SEC) From the original drawings and from limited view of the exterior walls through existing holes in interior finishes, thermal performance of the walls is substantially less than required by current Code. Air sealing as well as insulation improvements will be necessary if the building is to meet these requirements. Even so, substantial leniency in interpretation of the SEC requirements will be necessary. Under Chapter 1 of the 2012 SEC, a Building Official may modify the specific requirements of the Code for buildings with Landmark status, and require alternates which will not have an adverse effect on the designated historic features of the building. Further, for buildings undergoing substantial alterations, envelope energy performance within 20 percent of Code requirements is allowed under subsequent sections of the Code. RDH recommends an early conference with Seattle DPD officials to determine requirements for the building. A more accurate assessment of the thermal performance improvement options will depend upon interpretation of the historic preservation requirements by a Code official.

3.1 Walls

With any program of improvements, it will be important to model thermal improvements to the walls in order to confirm that they are not detrimental to the historic cladding system. As mentioned, water has been entering behind the cladding. Heat loss through the concrete walls, and, to a lesser extent, air leakage has had the effect of drying the wall assembly to the exterior. New insulation and establishment of an air barrier system will change the hygric equilibrium of these walls.

RDH has found that in historic buildings of this construction type, less insulation may offer advantages in allowing the wall assembly to dry toward the outside, and thus contributes to the preservation of the façade materials. In the case of the wall assembly and the windows, two options are provided as conceptual recommendations, and as a starting point for budgeting purposes. RDH recommends thermal modelling of insulation and air barrier option coincide with budgeting in order to determine the optimal assembly.

Design of specific enclosure details, as well as performance evaluation of alternative wall assemblies are dependent upon both SEC interpretation and thermal modeling, and thus outside the scope of this report.

RECOMMENDATION	
1	Repair corbeled stone at main entry; check anchorages, apply PMMA coating and re-grout mortar joints
2	At selected locations on the South elevation, repair stone veneer panels and re-grout mortar joints
3	At selected locations in the West elevation terra cotta brick, replace lintel flashings, coat lintel angles, and replace brickwork.

RECOMMENDATION	
4	Pressure wash stone veneer at all elevations and apply a clear sealer.
5	Apply an elastomeric coating at all exposed concrete walls.
6	Where interior finishes are to be replaced, provide an air barrier assembly and air sealing protocol.
7	Budget for computer modelling of wall thermal performance as part of a strategy to comply with the 2012 WSEC.

3.2 Roof and Plaza Deck

As mentioned earlier, the roof and plaza deck assemblies are exceptionally robust and appear to have been well maintained. RDH identified no areas of active leaks from either assembly on this building. In the Building Enclosure Assembly Matrix below, recommendations are provided for adding insulation above the existing waterproof membrane at the low slope roof and at the plaza deck without altering at-grade transitions.

The existing roof structure has an R-value of approximately R-14. If a substantial amount of insulation is to be added RDH recommends locating approximately 1/3 of it directly below the roof deck.

RECOMMENDATION	
8	Replace sealant joints at roof parapet caps and reglets
9	Replace flashing and sealant at planter-to-wall transitions
10	Add fireproof insulation at the underside of the roof deck.
11	Add rigid insulation under the ballasted pavers on the roof.

3.3 Below-Grade Wall Assemblies

Existing garage areas will need to be identified as unconditioned spaces, with thermal and air barriers established to separate these spaces from conditioned below-grade areas. For the purposes of budgeting in this report, we assume that the same approach will be taken to establish these barriers as would be used at below-grade exterior walls.

RECOMMENDATION	
12	Add fireproof insulation at perimeter walls below grade.

3.4 Windows & Doors

As a Substantial Alteration, non-historic windows in the building will need to be replaced in order to meet the 2012 Energy Code. The Building Enclosure Assembly Matrix below provides two options for window improvements as a starting point for budgeting purposes. It is our understanding that the Historic entrance and Lobby areas will be exempted from meeting the Code, and improvements to their thermal performance are not considered in this report.

RECOMMENDATION	
13	Option 1: Replace all 1985-era windows.
13	Option 2: Replace all nonhistoric windows, including glass block, with windows to meet current Code

3 Summary of Recommendations

Our recommendations are based on a combination of factors including a review of design drawings and other available documentation, information collected at the building through visual observations and exploratory openings, as well as experience and knowledge gained from investigations of many other buildings with similar assemblies and details.

Error! Reference source not found. lists all building enclosure rehabilitation and renewal tasks that were identified in Section 3 of this report. These recommendations form the basis for the costing that is provided and discussed in the following section of this report.

TABLE 3.1	SUMMARY OF RECOMMENDATIONS
1	Repair corbeled stone at main entry; check anchorages, apply PMMA coating and re-grout mortar joints
2	At selected locations on the South elevation, repair stone veneer panels and re-grout mortar joints
3	At selected locations in the West elevation terra cotta brick, replace lintel flashings, coat lintel angles, and replace brickwork.
4	Pressure wash stone veneer at all elevations and apply a clear sealer.
5	Apply an elastomeric coating at all exposed concrete walls.
6	Where interior finishes are to be replaced, provide an air barrier assembly and air sealing protocol.
7	Budget for computer modelling of wall thermal performance as part of a strategy to comply with the 2012 WSEC.
8	Replace sealant joints at roof parapet caps and reglets
9	Replace flashing and sealant at planter-to-wall transitions
10	Add fireproof insulation at the underside of the roof deck.
11	Add rigid insulation under the ballasted pavers on the roof.
12	Add fireproof insulation at perimeter walls below grade.
13	Option 1: Replace all 1985-era windows.
13	Option 2: Replace all nonhistoric windows, including glass block, with windows to meet current Code

4 Matrix of Building Enclosure Assemblies

The matrix below provides a summary of our recommendations for building enclosure assemblies at the Federal Reserve Bank of Seattle. Further clarification of these assemblies and recommended options will be included in the building Condition Assessment Report.

Location	Existing Assembly	Product Recommendations & Comments	Quantity (SF or LF)
Above-Grade Cast-in-place Concrete Walls and Masonry Veneer	→ Pressure-wash, grind out and re-point mortar joints, South elevation		→ Approx. 4,500 S.F.
	→ Replace head flashings, re-coat lintels, and repair masonry at terra cotta brick, selected windows, West elevation		→ (See Pioneer Masonry Condition Report)
	→ Apply vapor permeable sealer at all stone and masonry veneer	→ Prosoco Siloxane PD or similar silane/siloxane blend	→ Approx 21,500 S.F.
	→ Apply Elastomeric paint at exterior concrete walls	→ STO Lotusan	→ Approx. 18,000 S.F.
Exterior Wall Insulation	→ Interior finishes to be removed	→ **Option 1**- 2" Spray-applied fire retardant Insulation	→ Approx. 30,000 S.F.
		→ 2" Mineral Fiber Batts	→ Certainteed MemBrain
		→ Sheet Vapor Retarder	→ Certainteed MemBrain

Location	Existing Assembly	Product Recommendations & Comments	Quantity (SF or LF)
		→ Target R-value : R-8 → Option 2- 1" Spray-applied fire retardant insulation → 3" Mineral fiber batts → Sheet vapor retarder → Target R-value: R-17	
Plaza Deck	→ Existing pavers to remain → Existing hot rubberized asphalt membrane to remain → Concrete deck → Spray-applied fireproofing	→ Add 3" insulation above plaza deck under pavers → Add Rigid insulation to R-25 to underside of deck → (Maintain Fire rating) → Re-seal/replace roof-to-wall flashings at planters → Target R value of Assembly; R-38	→ Approx. 12,000 S.F.
Low-Slope Roofing	→ 2" pavers with 1 ¾" EPS Insulation	→ Add 2" rigid insulation under existing concrete ballast pavers	→ Approx. 12,500 S. F.

Location	Existing Assembly	Product Recommendations & Comments	Quantity (SF or LF)
	→ 2 ½" EPS foam insulation → Hot Rubberized asphalt waterproofing → Concrete Topping slab → Structural Steel deck → Spray-applied fireproofing	→ R-13 Mineral wool insulation at underside of decking → Re-do sealant joints at parapet and reglets. → Target Roof assembly R-38.5	→ Approx. 500 L.F.
Below-Grade Walls	→ Soldier pile and lagging/concrete retaining walls → Waterproofing and/or drainage system unknown → Interior finishes to be removed	→ 1" Spray-applied fire retardant insulation Air/vapor barrier → Mineral wool insulation to R-13 (Maintain fire rating) → Target R-Value of assembly; R-14	→ Approx. 12,000 S.F.
Non- Historic Windows		→ **Option 1- Full Replacement** New windows to meet 2012 Code → Install backdam angle at each rough opening → Fluid applied WB such as ProSoCo Fast Flash at all window openings → Interior air barrier sealant at each window	→ 93 openings

Location	Existing Assembly	Product Recommendations & Comments	Quantity (SF or LF)
Non-Historic Windows	→ 1996 windows to remain → Glass block windows to remain	→ **Option 2- Selective Replacement** → Replace 2nd, 3rd and 4th floor windows on N., E., and W. elevations to meet 2012 Code → Install backdam angle at rough openings where replacement occurs → Fluid applied WB such as ProSoCo Fast Flash at all window openings → Interior air barrier sealant at each window	→ 75 openings
Front Entry	→ Stone corbels with hidden anchorages	→ PMMA membrane to cover entire top surface → Replace mortar joints	→ 50 SF
Ancillary Waterproofing items		→ **General Purpose Silicone Weatherproofing Sealants;** Dow Corning 790, 791, 795; Tremco Spectrem 1, → **Sheet Metal Flashing;** Kynar 500/Hylar 5000 coated, 24	

Location	Existing Assembly	Product Recommendations & Comments	Quantity (SF or LF)
		ga., G90 or AZ50 coated base metal → **Interior Air Barrier Sealant at Window;** Dow Corning 758 → **Paintable Exterior Sealant;** Sonolastic VLM 150; Bostik ChemCalk 2000 → **Flashing and Self Adhered Membrane at Masonry;** Stainless Steel over WR Grace Perm-a-Barrier	

.

5 Estimated Rehabilitation Project Costs

It is important to understand that the budget construction costs are based on our experience with similar projects; they are presented as probable costs for the program listed in the previous section and are based on approximate unit rates without a complete design developed. Budget estimates will be refined and a more precise overall figure will be obtained during the design, construction documents, and tendering phases of the project. The actual cost will be established when the contractors bid on the project and when a contract is awarded. The construction industry pricing environment can vary significantly and is dependent, to a certain extent, on factors external to the actual project.

In addition to construction costs, allowance needs to be made for project costs such as fees, permits and owner contingencies. In order to assist you in planning and to advise on the relative magnitude of other project costs, the following is an example of the Estimated Project Costs for the recommended rehabilitation program. An owner contingency of 10% is included. An owner contingency is essential in rehabilitation construction to account for costs that may arise in the event of unforeseen damage or issues not directly related to the enclosure rehabilitation project.

TABLE 5.1 ORDER OF MAGNITUDE REHABILITATION COSTS

	Quantity	
Roof Insulation Improvements		132,000
Plaza Deck Insulation Waterproofing		15500
Below-Grade Insulation		41160
Window Replacement Option 1		318000
Window Replacement Option 2		256000
Exterior Wall Insulation Option 1		186600
Exterior Wall Insulation Option 2		165000
Cladding Repairs and Sealing		See Pioneer Masonry est
Order of Magnitude Construction Cost		$ 693,260
Consultant Cost		$ 69,326
Owner Contingency (allowance 10%)		$ 69,326
Landscaping, security, legal (owners discretion)		$ -
Permit Fees		$ 10,399
Warranty Costs		$ -
Sub Total		$ 842,300
Tax (6.5%)		$ 54,750
Total Project Cost (Rounded)		$ 897,000

6 Next Steps

The condition assessment report presents conceptual level recommendations with respect to rehabilitation and renewal activities. It is important to understand that these recommendations do not provide a basis for implementing remedial work. Conceptual recommendations need to be developed, refined, and documented in detail before the construction work can be tendered to contractors or a building permit obtained.

The next step typically begins with the design process where the consultant considers alternative ways of addressing existing problems and assists you in making decisions with respect to specifics of the rehabilitation program. Once these decisions are made, the selected design is developed and documented in greater detail in the form of drawings and specifications. These documents indicate the exact extent and nature of the remedial work, and materials to be used.

I trust you find this preliminary information useful at this stage of the project. Please do not hesitate to contact RDH for additional information or to discuss next steps in the adaptive re-use of this important Seattle landmark.

Yours truly,

Tony Case | AIA
Senior Project Architect
tcase@rdhbe.com
RDH Building Sciences Inc.

CC Kji Kelly, Historic Seattle EMAIL kjik@historicseattle.org